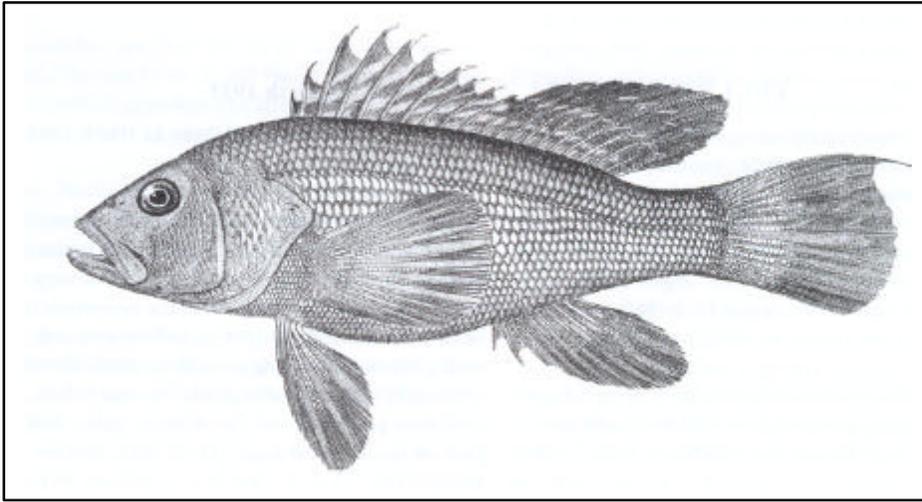


BLACK SEA BASS / *Centropristis striata* (Linnaeus 1758) / Bigelow and Schroeder 1953:407-409 (as *Centropristesstria!*UJ)



Description. Body moderately stout, depth 25-33% SL, with a rather high back (Fig. 208). Head flat-topped, snout moderately pointed. Mouth large, oblique. Eyes set high on head. Jaw teeth in wide bands, outer and inner teeth slightly enlarged; vomerine teeth in crescent-shaped patch; palatine teeth in long, narrow patch. Spiny and soft portions of dorsal fin (which originates slightly in front of the rear corner of the gill covers) separately rounded, the latter higher than long. caudal fin rounded posteriorly; distinctly three-lobed in large fish. Anal fin originates under or very slightly behind origin of soft portion of dorsal fin, which it resembles in rounded outline. Both anal fin and soft part of dorsal fin noticeably soft and flexible. Pectoral fins so long that they reach back almost to anal fin, broad and round tipped. Pelvic fins large, originating in front of pectorals. Scales rather large; top of head naked. Adult males develop a hump in front of dorsal fin.

Meristics. Dorsal fin rays X, 11; anal fin rays III, 7; pectoral fin rays usually 18-20; total gill rakers 23-29; vertebrae 10 precaudal + 14 caudal (Miller 1959; Kendall 1977).

Color. Black sea bass, like most fishes that live on rocky bottoms, vary widely in color, the general ground tint ranging from smoky gray to dusky brown or blue black, usually more or less mottled. Belly only slightly paler than sides. Bases of exposed parts of the scales are paler than their margins, giving the fish the appearance of being barred with longitudinal series of dots of a lighter tint of brown than the general hue on dark fish, but pearl gray on pale ones. Dorsal fin marked with several series of whitish spots and bands; other fins mottled with dusky. Young fish 5-7 cm long greenish or brownish with dark side stripe passing from eye to caudal fin, with dark crossbars on sides.

Size. Reach 60 cm (Robins and Ray 1986). The all-tackle game fish record is a 4.65-kg fish caught at Virginia Beach, Va., in January 2000 (IGFA 2001).

Distinctions. Black sea bass are easily distinguished from striped bass and white perch by the fact that spiny and soft-rayed portions of the dorsal fin are continuous, so that there is only one long fin instead of two short separate fins. The general form, rounded caudal and

pectoral fins, and the short but high anal fin are sufficient to separate them from scup; their color precludes confusing them with redfishes, and they should not be taken for tautog or cunner because the mouth and the pectoral fins are much larger, the caudal fin has a different outline, and the soft portion of the dorsal is as long as the spiny portion. They differ from wreckfish in many respects, especially in their much larger scales, smoothness of head and gill covers, and shape of the tail.

Taxonomic Note. Bigelow and Schroeder referred to black sea bass as *Centropristes striatus* but Briggs (1960b) showed that the correct original spelling of the genus is *Centropristis*, which is feminine so the species name has to be emended to *striata*.

Habits. Black sea bass contrast with striped bass in being strictly confined to saltwater although juveniles are common in higher-salinity portions of estuaries, usually greater than 14 ppt. Life history information was summarized by Mercer (1989). The inshore-offshore range extends from close in to the coastline in depths of only 1 m out to about 165 m (Musick and Mercer 1977), according to the season of the year. During the part of the year that sea bass are inshore they are most plentiful on hard bottom, in water less than 36 m or so, often around submerged wrecks and pilings of wharves. offshore they prefer ledges and banks, generally over hard bottoms of rock or coral (Hildebrand and Schroeder 1928). In the South Atlantic Bight, they prefer the inshore sponge-coral habitat (Wenner et al. 1986). They can tolerate temperatures from 6° to 29.8°C (Musick and Mercer 1977; Hardy 1978b) but are rarely found below 11°C (Miller 1959). Minimum salinity tolerated is 7.7 ppt (Hardy 1978b), but in estuarine areas they are not common in salinities lower than 12 ppt (Musick and Mercer 1977).

Black sea bass travel in small schools when migrating inshore and offshore. They produce sounds that include single weak grunts, small thumps, and possible scrapes; the thumps appear to be associated with escape and competitive feeding. They have a large, elliptical single-chambered swim bladder, which can be vibrated by general body contraction and striking of opercula against the body. Paired patches of pharyngeal teeth can generate stridulatory sounds (Fish and Mowbray 1970).

Food. Black sea bass feed on a wide variety of crustaceans, fishes, mollusks, and worms (Miller 1959; Maurer and Bowman 1975; Steimle and Ogren 1982; Sedberry 1988; Bowman et al. 2000). Crustaceans, particularly decapods, are important in the diet across all size categories: *Crangon septemspinosa* up through 10 cm TL and *Cancer irroratus* from 6 cm on (Bowman et al. 2000). The euphausiid *Meganyctiphanes norvegica* is important at intermediate sizes, 11-25 cm. Fishes, including anchovies and herring, first become a major component of the diet at 21 cm and account for 69% of the food consumed at sizes of 40 cm and larger. Other fishes eaten include margined snake eel, seahorse, pipefish, cusk-eel, scup, sand lance, and windowpane.

Predators. Among fishes sampled for food content by the NEFSC bottom trawl surveys, predators of black sea bass include little skate, spiny dogfish, goosefish, spotted hake, windowpane, and summer flounder (Rountree 1999).

Breeding Habits. Black sea bass are protogynous hermaphrodites, changing sex from female to male (Lavenda 1949). Median length at maturity for both males and females is about 19 cm TL (O'Brien et al. 1993). They reach this size between

ages 2 and 3 but males may mature as early as age 1 (Mercer 1978). Sexual succession occurs at ages 1-8 (Mercer 1978; Wenner et al. 1986). Increased ovarian activity and degeneration coincide with proliferation of testicular tissue during the change. There has been no instance of active ovarian development concurrent with testicular degeneration. Sexual transition begins in the posterior region of the ovary and proceeds anteriorly: Wenner et al. (1986) determined that 3% of the fish showed simultaneously developed hermaphroditic gonads at all maturity stages, but they could not tell whether the fish could self-fertilize. Sex ratios were significantly skewed in favor of females up to an intermediate age and then favored males. No females were found among fish over age 7. Although some fish may always be males, most males are sexually reversed females.

Black sea bass are sexually dimorphic. Males larger than 25 cm have an adipose hump; they are bright blue at spawning time especially around the hump and eyes. Females are darker and duller. After spawning they become brownish and some even become almost white (Lavenda 1949).

Spawning progresses seasonally from south to north starting as early as April off North Carolina and Virginia and in June off New Jersey and Long Island (Able et al. 1995; Berrien and Sibunka 1999; Fig. 49). Peak spawning is in August; eggs are found from south of Chesapeake Bay to off Long Island, but not in the Gulf of Maine. Spawning occurred predominantly in the inner half of shelf waters in depths of 18-45 m (Kendall 1972; Berrien and Sibunka 1999).

Early Life History. The eggs, which are buoyant, transparent, and clear, have a diameter of 0.9-1.0 mm, a single oil globule with a diameter of 0.13-0.19 mm, and a narrow perivitelline space. The egg membrane is smooth and unsculptured (Fahay 1983).

Embryonic development was described by Wilson (1891) at an unspecified temperature, which was probably close to 16°C. Incubation takes 5 days at 15°C (Kendall 1972) and 3 days at 23°C (Hoff 1970). Length at hatching is 1.5-2.0 mm SL. Larvae are deep-bodied with large heads (30-40% of SL). The vent is approximately at midbody; the pigmented oil globule is located in the anterior part of the yolk sac, which is absorbed after 3 days. There are ventral pigment spots from the throat to the caudal fin base, a medial spot posterior to the lower jaw, one on each angular, one at the junction of

the cleithra, and one at the vent. Most key larval characteristics are present by 5 mm SL.

Black sea bass larvae resemble those of bluefish, but the latter have a pigment pattern of three rows of melanophores (dorsal, midlateral, and ventral). They also resemble spot (*Leiostomus*) and croaker (*Micropogonias*) except that sea bass have much larger pectoral fins and the anus is closer to the middle of the body. The young are easily identifiable as sea bass by the time they have grown to a length of 60 mm.

Larvae are distributed across much of the Mid-Atlantic Bight continental shelf north to New Jersey and Long Island; greatest abundance occurred between Cape Hatteras and Delaware Bay in August (Able et al. 1995; Fig. 3; Steimle et al. 1999d; Fig. 11). A single 6.4-mm larva was collected on Georges Bank in November 1982 (Able et al. 1995), and a few have been reported from Cape Cod Bay (Scherer 1984). Larvae have been found in inlets (Kendall 1972), bays (Herman 1963), and offshore waters (Perlmutter 1939; Able et al. 1995), at a distance of 4-82 km from the shore at maximum depths of 18-33 m in waters 15-51 m deep. Large larvae are found deeper than small ones. Based on NEFSC MARMAP surveys, larvae were most abundant between 13°-21 °C (Steimle et al. 1999d; Fig. 5). Sea bass larvae migrate into estuaries at an early stage and become benthic at 13-24 mm (Kendall 1972). They enter high salinity estuarine areas in August and September in southern Massachusetts, in August in New York and on Long Island, and in July in Delaware Bay (Nichols and Breder 1927; de Sylva et al. 1962; Lux and Nichey 1971). They remain in these nursery areas until temperatures go below 14°C, then migrate into deeper waters. Young-of-the-year in the Chesapeake Bay area move southwestward at depths less than 55 m. They winter at depths of 55-110 m and migrate north with spring warming (Musick and Mercer 1977).

Age and Growth. Lavenda (1949) gave age-length curves for male and female sea bass from New Jersey based on scale analysis. Sea bass from the South Atlantic Bight were aged by otolith increments (Wenner et al. 1986). Annulus formation occurred in April and May and might have been associated with spawning. Growth is almost linear to age 6 and then slows. Sea bass from the Mid-Atlantic Bight are larger at a given age than those from the Southern Atlantic Bight (Mercer 1978). Northern individuals are seldom heavier than 2.3 kg and average about 0.7 kg; a 30-cm fish weighs about 0.5 kg; and one of 46-51 cm weighs about 1.4 kg. Growth of juveniles (34-111 mm TL) in a southern New Jersey estuary, based on recaptured fish, was fastest during summer (0.74 mm.d⁻¹), but averaged 0.45 mm.d⁻¹ from spring through fall (Able and Hales 1997).

General Range. Atlantic coastal waters of the United States, from Cape Canaveral, Fla., to Cape Cod, occasionally to Nova Scotia and the Bay of Fundy (Scott and Scott 1988).

Occurrence in the Gulf of Maine. Black sea bass enter the Gulf only as rare strays from the south, Pemaquid Point and Martinique Island off Penobscot Bay; Maine, being the northernmost known outposts. They occur occasionally in Passamaquoddy Bay and the Bay of Fundy; N.B. (Scott and Scott 1988). They have been taken in Casco Bay; near Gloucester; off Nahant, Salem, Beverly; and Cohasset in Massachusetts Bay; at North Truro and Monomoy on Cape Cod; and 8 km east of Pollock Rip Lightship (Bigelow and Schroeder; Read 1975; Collette and Hartel 1988).

Migrations and Movements. Trawl surveys made in the MidAtlantic Bight (Musick and Mercer 1977) showed that black sea bass migrate south and offshore to the Chesapeake Bight, where the population spends the winter. Larger and older fish move offshore earlier than young-of-the-year, and winter in deeper water (73-165 m). In the spring, sea bass migrate inshore and to the north. Adults move to their coastal spawning grounds and juveniles to estuarine nursery areas, most likely in response to water temperature. Juveniles leave estuaries when temperatures fall below 14°C (Richards and Castagna 1970; Lux and Nichy 1971). Off southern New England, Long Island, and New Jersey, they appear inshore during the first or second week in May, withdrawing again late in October or early in November. Most adults are captured in waters 9°C or warmer. In South Carolina, where temperatures rarely go below 10°C except in shallow estuaries, adult sea bass in given areas are year-round residents and do not migrate.

Stocks. Two stocks are recognized, divided at Cape Hatteras (Shepherd 1998b). Meristic and morphometric studies indicate that some variation is present within the northern stock (Shepherd 1991), which migrates seasonally in response to temperature changes and spawns June to October. The southern stock does not appear to migrate and spawns in April and May (Mercer 1978).

Importance. Black sea bass are too scarce to be of any importance in the Gulf, but they are very valuable food and game fish in southern New England and the Mid-Atlantic Bight. The commercial otter trawl fishery is primarily a winter fishery and produces 60% of the total catch of black sea bass, scup, and summer flounder (Shepherd and Terceiro 1994). The inshore trap fishery, which occurs between late spring and late autumn, consists mostly of black sea bass. Reported commercial landings north of Cape Hatteras fluctuated around 2,600 mt from 1887 until 1948, when landings increased to 6,900 mt, peaking at 9,900 mt in 1952 (Shepherd 1998b). Since 1962, commercial landings have fluctuated between 4,000 and 1,000 mt. year⁻¹ (Fig. 209).

Estimated recreational landings, primarily in the Middle Atlantic states, are comparable to the commercial catch. The recreational fishery takes place between late spring and autumn (Shepherd and Terceiro 1994). U.S. recreational landings have ranged from 700 to 6,300 mt since 1979, averaging 2,100 mt, accounting for 31-87% of the total landings (Shepherd 1998b).

Black sea bass are managed under Amendment 9 to the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan developed in 1996. Management measures include gear restrictions, minimum fish sizes, a coastwise commercial quota, and a recreational harvest limit (Shepherd 1998b).

Hormone-induced ovulation of black sea bass and rearing of larvae were described by Tucker (1984) and Hoff (1970). This fish may have mariculture potential as other species of sea basses have shown promise. Hettler and Powell (1981) described a culture system for rearing sea bass.

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